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Inventory of Activities of Learning Technologies at University: Cross-Cultural Adaptation in the National Context of Russia

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This research estimates the adequacy of translation and adaptation of the Inventory of Activities of Learning Technologies at the University (IAATU) in the national context of Russia. The IAATU is proved to be internally consistent and well comprehended.

Key words: competencies, University teachers, technology based learning activities, confidence, instrument, cross-cultural, Russia.

Introduction

UNESCO ICT competency framework for teachers (UNESCO, 2011) emphasizes that it is not enough for teachers to have Technology Information and Communication (ICT) competencies and be able to teach them to their students. Evaluation of professional competence is performed by comparing the obtained results with some norms and averages, as well as with the results of previous diagnosis to identify the nature of the advance in the development and professional growth of a teacher and leader (Simonov, 2010). In addition, the fact of having extensive skills in ICT use has not been linked to their use in academic activities: the abilities developed through using the computer do not seem to be transferred – or at least not to the degree expected – to learning (Romero, Guitert, Sangra, & Bullen, 2013). According to Marcelo & Yot (2015), to incorporate technologies into their teaching, teachers need to design teaching-learning experiences based on three interrelated TPACK components. These are the content to be taught (content knowledge), the pedagogical model upon which teaching is based (pedagogical knowledge), and the technological resources that teachers select at a given moment (technological knowledge).

This subject is considered to be an important research issue, since adopting a new type of learning requires a specific study on whether the audience and the teachers are ready for new forms of education. It is impossible to introduce new technologies if the target audience is not ready to absorb the information presented by new methods (Yanuschik, Pakhomova, & Batbold, 2015). In fact, it is necessary to understand how technology is taught and implemented in order to improve the developed competency and the technology used in learning (Lemon & Garvis, 2016). Over the last years, researchers have made efforts to identify the competencies that prospective teachers need in relation to technology (Lee & Lee, 2014; Valtonen, Kukkonen, Kontkanen, Sormunen, Dillon, & Sointu, 2015; van den Beemt & Diepstraten, 2015), and ICT instruments have been developed in order to assess the effective strategies to prepare prospective teachers for technology integration (Tondeur, van Braak, Siddiq, & Scherer, 2015; Arki, Kiss, & Gastelш, 2015; Tondeur, Aesaert, Pynoo, Braak, Fraeyman & Erstad, 2015).

Although there are several studies on teacher competencies in the context of Russia (Drovnikov, Vazieva, Khakimova, & Konyushenko, 2016; Mokshina, 2015; Mirzagitova & Akhmetov, 2015; Erganova & Shutova, 2014); there is a lack of knowledge related to this approach, particularly in Russia. One possible strategy to cover up the lack of knowledge is to validate a Russian version of the IAATU (Marcelo, Yot, & Mayor, 2015). To adapt a questionnaire with documented validity rather than to create a new one is recommended (Beaton, Bombardier, Guillemin, & Ferraz, 2000; DeVellis, 2003; Lovelace & Brickman, 2013) under the condition that the construct exists in the target culture and the existing instrument measures it appropriately (Epstein, Santo, & Guillemin, 2015). This instrument may help to understand how effectively university teachers in the context of Russia use the technology in the learning design.

The IAATU was developed focusing on the didactic aspect and represents the design of learning activities enriched with technologies. In the course of the research the authors analyzed how different digital technologies are integrated into the classrooms of the Andalusian universities. Since the level of technology integration in learning sequences is known (Marcelo, Yot & Mayor, 2015), the Cronbach's alpha coefficient for the IAATU is 0.958. It has 38 items distributed among 1 to 6 on a double Likert-type scale. One refers to the frequency with which it is used (usage level) with internal consistency measured using Cronbach's alpha coefficient of 0.912, while the other refers to the degree to which the teacher feels confident when using the activity (confidence level), Cronbach's alpha = 0.937.

According to Hsu (2011), the activities the teachers suggest to the students are influenced by their own usage of ICTs. Recently, the relationship between teachers' own ICT practices and the type of ICT activities they assign to students has been examined. The research outcomes indicate that teachers' technology integration practice could determine their knowledge in technology integration to a large extent (Chuang, Weng, & Huang, 2015). Therefore, there are variations in the educational use of digital technology by teachers. These patterns of ICT use emerge from the frequency of use (the amount of times they use it) and by the nature of the activity (the type of tasks and grouping when working with ICTs in the classroom) (Area-Moreira, Hernбndez-Rivero, & Sosa-Alonso, 2016).

Confidence is considered a strong predictor of teachers' technology use (Wozney, Venkatesh, & Abrami, 2006). One of the explanations for the gap between what teachers know and what they do relates to their confidence, or self-efficacy, for performing the task successfully (Ertmer & Ottenbreit-Leftwich, 2010). In terms of digital technology, recent empirical studies show how self-efficacy can determine the level of teacher confidence and competence to engage with a task (Lemon & Garvis, 2016).

The IAATU use the taxonomy of Conole (2007) to classify the various types of technology-based learning activities. The taxonomy of Conole & Fill (2005) attempts to consider all aspects and factors involved in developing a learning activity, from the pedagogical context, in which the activity occurs, to the nature and types of tasks undertaken by the learner. This taxonomy classifies types of the learning activities used to achieve the intended learning outcomes into six areas: assimilative tasks, information handling, adaptive, communicative, productive, and experiential.

The original study included 291 Andalusia teachers. The IAATU was subject to a validation process by experts and sixteen university lecturers from various universities and fields of knowledge. It is noteworthy that there was statistically significant concordance among the values assigned to the various items.

Speaking about the global educational practices, the authors of the Russian education modernization strategy argue that competences are of integrative nature and, therefore, suggest an innovative vector

of educational practice development. Currently, the competency-based approach tends to be more holistic in terms of its structure (Erganova & Shutova, 2014). According to Mokshina (2015), one of the important issues of the would-be teacher training in Russia is the lack of their practical preparation for professional activities. Despite this study's findings, little is known about what technologies do Russian teachers use in their teaching design, in particular, those that are related to learning activities. The IAATU is useful to analyze how different digital technologies are integrated into the classrooms of the Russian universities and can also be used as an instrument to identify what type of learning activities based on technologies university teachers design in Russia.

An objective measure applicable to a university level will offer a start point to explore a multidimensional research on the developing teachers' professional skills and competencies in Russia. There were two research objectives: the main one was to adapt and validate the IAATU in the national context of Russia, and the second objective was investigate how intensively the technology is used to design the teaching-learning process in relation to teacher's confidence.

Sample

The pilot-test (i.e. the Russian version of the IAATU) was conducted as an online survey from February to April. The sample included 103 responders, 52.4 % of them being female and 47.6 % male. 43.7% of the respondents were in the age group of 31-40, 17.5% under 31 and 9.7% over 61. The teachers of Samara National Research University (Russia) made up 44.7%.

Methods

As the evidence for the best method for cross-cultural adaptation of questionnaires is lacking, and back translation may not be mandatory (Epstein et al., 2015), the research involved individuals fluent in both English and Russian, as well as the committee to review the translation from English into Russian (Geisinger, 1994). The adaptation process described below was used as the most appropriate in the context of the questionnaire of interest (Epstein et al., 2015). When the author's permission to adapt the IAATU within the Russian national context was received, the instrument was translated from English into Russian by a bilingual person, with Russian as mother tongue. Then the expert group consisting of three professionals specializing in technology education discussed the translated concepts in order to find the cross-cultural equivalents (Beaton et al., 2000). The content was validated by the expert group. Once the pre-final version was ready, it was administered through an online questionnaire. A link with the questionnaire (http://goo.gl/forms/otScqvE7WE) was sent by email, explaining the purpose of the study. This pilot study was conducted to strengthen both the semantic and content equivalence of the IAATU. Following guidelines for cultural adaptation of instruments (Hambleton & Patsula, 1999) the pilot version was administered first to 40 teachers to assess their understanding and the feasibility of administration. In relation to content validity, some stylistic changes were made by the expert group between the phases of translation and the pilot-test. With the author's consent, Likert-type scale was adapted to 1 to 5. The general structure of the instrument was preserved and adapted with great care to ensure the best properties possible (Epstein et al., 2015).

The IAATU with 38 items developed by Marcelo et al., (2015) includes initial questions to collect demographic information such as: sex, age, university, field of knowledge and professional category, and specific items related to learning activity types: assimilative, information management, communicative, productive, experiential and evaluative, asking their level of agreement with each statement, and suggestions to be considered. Providing an estimate of the internal consistency of each Likert scale increased confidence that items on each scale were measuring something similar (Lovelace & Brickman, 2013).

Nonparametric techniques, Mann-Whitney and Kruskal-Wallis tests, were applied to analyze possible changes in teacher's gender or age in relation to usage and self-confidence level. To measure the strength of association between two ranked variables – the level of use of different learning activities and self-confidence, the Spearman's rank-order correlation was used.

The data were analyzed by using IBM SPSS Statistics, and univariate descriptive statistics were used to describe the sample characteristics and frequency of learning technology use. The reliability estimation method Cronbach's alpha was used to ensure internal consistency (Field, 2009; van der Palm, van der Ark, & Sijtsma, 2014) for the scales of level of use (0.916) and self-confidence (0.939), with a value above 0.957 showing very good reliability and internal consistency of the scale, which meets the criteria of reliability.

Results

According to the level of use (Cronbach's alpAccording to the level of use (Cronbach's alpha=0.916), three groups of learning activities are identified in relation to the mean: low level (mean 1-2.5), medium level (2.5- 3.5) and high level (3.5-5). The two technology based learning activities used are of assimilative type, i.e. promoting the transfer of knowledge from the teacher to the student: (1) In my class I use presentations created using a computer program (PowerPoint, Prezi, Impress, etc.) to show students concepts and ideas regarding subject content (3.68) and (3) During my presentations for the students, I show simulations, demonstrations or examples based on digital resources, either my own, or available on the web, to clarify concepts and ideas (3.59).

As for the other activities, another three items are frequently incorporated into teaching (M > 3.5): Information management, (10) I teach students to verify whether the information obtained is true or the information sources found when searching the Internet are reliable. (4.17); Communicative, (16) I develop online tutorials by means of various communication tools (email, videoconference, messenger, chat, etc.) to respond to student's queries or doubts. (4.32) and Productive, (23) I encourage students to present their results in a creative manner, using presentation infographics, presentations, concept maps, etc. (3.87). The five items show high level of confidence over 3.5, however, items 10 and 23 have the highest level: 4.22 and 4.31, respectively.

The experiential type of activities (creating educational environment simulating the reality) have a low level of use (M≤2.5) with the exception of (13) I design practical case studies, using digital resources (videos, presentations, specific software, etc.), so that students can apply the theory learned to practice: 3.37 (medium level M<3.5).

Practically all of the evaluative activities (aiming at evaluating student's learning) are characterized by low level of use (M≤2.5), except for item (35) I use anti-plagiarism software when assessing students' papers to guarantee that these are original works (3.38) (medium level of use M<3.5).

Within the scope of the research, there were 103 teachers involved (the national academic staff in miniature), the null hypothesis suggested was that there is no association between the use of learning activity and self-confidence (r = 0). Statistical significance, set $\alpha \leq 0.05$, indicates that the null hypothesis can be rejected. A statistically significant Spearman rank-order correlation means that if the null hypothesis is true, the probability of occasional strong connection between the use of a learning activity and self-confidence (rho coefficient 0.01) is less than 5%.

Considering the value of r indicating the type and importance of the linear association (Table 1), we know, first, that the relationship in all cases is positive (an increase in self-confidence level takes place with an increase in the level of use and vice-versa). Secondly, the association is moderate ($0.30 \leq | r | \leq 0.70$) for items 1, 2, 3, 4, 5, 8, 10, 11, 14, 16, 18, 20, 25, 33, and 34, while for the rest of the items the correlation is strong ($| r | > 0.70$).

Based on the results obtained in Kruskal-Wallis Test0, it can be asserted that there are significant differences in the level of self-confidence depending on the age. The p-value of less than 0.5 leads to rejection of the null hypothesis for the variables "age"

and "self-confidence" in items 11, 17, 21, 22, and 34. As for the activities of learning technologies in use and the variable of age, significant differences were found in items (11) I use concept maps created with specific software (MindManagers, CmapTools, etc.) to help students understand the structure and relationship between subject concepts (0.25) and (17) I facilitate interaction with students outside the classroom by means of cellphone applications such as WhatsApp, Line, Twitter, Facebook, etc. to motivate exchange of information, resolution of doubts (0.02).

Mann–Whitney U tests were conducted to compare differences between gender and self-confidence. Difference was found between men and women in items 2, 8, 11, 14, 20, 23, 25, 33, 34, 37. As for the activities of learning technologies, significant differences were found in items 10, 13, 18, 19, 21, 23, 25, 35, and 37 depending on gender.

Limitations

The sample size in the present study (N = 103) might be considered to be low (Tabachnick & Fidell, 2007; Field, 2009). Communality values in the present study were above 0.5, therefore, a sample size between 100 and 200 is sufficient (Field, 2009). Moreover, a small sample is commonly understood as any sample that includes 30 or fewer items, whereas a large sample is one in which the number of items is more than 30 (Kothari, 2004). Nevertheless, it is important to note that generalizations of findings should be made with caution. In further research it would be desirable to replicate the study with different samples in other subjects, disciplines, and/or other universities in order to obtain results that can be generalized and allow us to determine the reliability and validity of the IAATU in a diverse range of samples.

Although the expert group participated in the survey, there still were some ambiguities in the meaning of concepts in the translated version, which is evident from the teachers' comments. Back-translation ensures that the instrument is the same in the two languages, and assessment of internal consistency indicates reliability of the target language version (Maneesriwongul & Dixon, 2004). Studies comparing methods suggest that the back-translation should not be mandatory but can be useful as a communication tool with the author of the original questionnaire (Epstein et al., 2015).

Temporal stability should be analyzed through the retest method based on the measurements obtained by the application of the IAATU in the same group of respondents with one-month interval between tests (Beaton et al., 2000). Although the participants in the pilot test also had an opportunity to give their comments in the questionnaire, verbatim transcription reflecting conventional content analysis was missing (Hsieh & Shannon, 2005). Moreover, each respondent of the pre-test was not interviewed to probe about what he or she thought was meant by each questionnaire item and the chosen response (Beaton et al., 2000).

To overcome the possibility of biasness of the results, future work should include an offline questionnaire in the sample collection (Teo, 2000). As technology integration practice is subject to change, future research should adopt longitudinal design to collect data across time.

Conclusions

Based on the analysis of the data obtained, we can conclude that there is relationship between self-confidence and intensity of use of the learning activities technology by the teachers. This finding is consistent with the findings of Marcelo et al. (2015) and the validity of IAATU. Intensity of use of learning activity depends on teacher's self-confidence. The results of this study showed that the probability of using learning activity technologies is much higher if the teacher feels confident in using them.

The results of this research indicate that the teacher's confidence has a strong impact on the intensity of technology use (Wozney et al., 2006) and conform with the outcomes of the other empirical research (Lemon & Garvis, 2016; Greener & Wakefield, 2015; Bennett, 2014). Ertmer & Ottenbreit-leftwich (2010) suggest that an increase in teacher's confidence is connected with achievement of expected learning outcomes. However, more evidence is necessary to better understand this process.

Learning activities based on technology is a resource-intensive learning strategy that requires reliable and valid evaluation tools to measure effectiveness of the educational process. Due to the fact that testing for validity is an ongoing process, the properties of the IAATU should be further validated in different cultural contexts. The present results must be considered as a contribution to this process.

As a starting point of a multidimensional approach, this research describes the different ways the teachers use technology in educational purposes, and also offers an instrument adapted in the national context of Russia for future research. This study is expected to shed light on developing teachers' professional skills and competencies in Russian universities.

Table 1. Correlation coefficient Spearman Rho for different items

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9
Coefficient	0.522	0.598	0.561	0.676	0.661	0.769	0.704	0.308	0.762
Sig. (bil)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Item10	Item 11	Item 12	Item 13	Item14	Item 15	Item 16	Item 17	Item 18
Coefficient	0.641	0.586	0.830	0.754	0.686	0.784	0.695	0.840	0.688
Sig. (bil)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Item 19	Item 20	Item 21	Item22	Item 23	Item 24	Item 25	Item 26	Item 27
Coefficient	0.777	0.576	0.807	0.843	0.742	0.730	0.643	0.803	0.795
Sig. (bil)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Item 28	Item 29	Item 30	Item 31	Item 32	Item 33	Item 34	Item 35	Item 36
Coefficient	0.746	0.779	0.742	0.724	0.765	0.655	0.594	0.859	0.792
Sig. (bil)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Item 37	Item 38							
Coefficient	0.758	0.862							
Sig. (bil)	0.000	0.000							

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